... Because Data Transcends Time

Data Management and the CMM/CMMI: Translating Capability Maturity Models to Organizational Functions

Cynthia C. Hauer

Millennium Data Management, Incorporated

Huntsville, Alabama

CDM Industry Data Management Chair

NDIA TID Technical Information Division Symposium
Royal Sonesta Hotel, New Orleans, LA
August, 2003

Agenda

- Address the role of Data Management in the CMM/CMMI
- Assess CMMI guidance for DM
- Identify Missing Links
- Share the DM Maturity Model

DM in the CMMI

- Under project Management, Project Planning
- Description and definition of DM
- Data Requirements
- Data Content
- Data Collection
- Data Cost
- Typical work products
- Sub-practices

Plan for Data Management

SP 2.3-1 Plan for Data Management

Plan for the management of project data.

- Various forms of documentation
  - Administrative, engineering, CM, financial, logistics, quality, safety, manufacturing, and procurement
- Various formats
- Deliverables or non-deliverable
- Distribution forms (physical or electronic)

Description/Definition of DM

- CMMI does not really define DM
  - Functionally described, rather than defined
- Data is described in terms of “documentation”

Data Content

- Forms
- Media
- “Deliverability”
- Distribution

Data Requirements

- Established for the project
  - For data items, content, and form
- Based on a common or standard set of “data requirements”
- “Uniform content and format requirements for data items facilitate understanding of data content and help with consistent management of the data resources”.

Data Collection & Costs

- Reason should be clear
- Task includes analysis and verification applies to
  - project deliverables and non-deliverables
  - Contract deliverables and non-contract data requirements
  - customer-supplied data
- Stipulates understanding of how data will be used, prior to collection
  - Data is costly, and should be collected only when needed

Typical Work Products

- DM Plan
- Master List of managed data
- Data content and formal description
- Data requirements lists
- Privacy requirements
- Security requirements
- Mechanism for data retrieval, repro, and distribution
- Schedule for collection of project data
- Listing of project data to be collected

Sub-Practices

- Establish requirements and procedures to ensure privacy and security of the data
  - Procedures must be established to identify who has access to what data as well as when they have access to the data
- Establish a mechanism to archive data and to access archived data
  - Understandable form or represented as originally generated
- Determine the project data to be identified, collected, and distributed.

Assessment

- Rudimentary, but complete
- Functionally-oriented
- Evolved thinking
- DM is basically interwoven all over the CMMI
- A clear, concise definition of DM would be of great value to all CMMI users

Transferring CMMI Guidance to the Implementation Level

What can Maturity Models Measure?

Both the quantitative and qualitative aspects of success

Quantitative Factors

Planning
Tracking
Measurement
Quality Goals
Documented Processes
Peer Reviews
Allocation of Dedicated Resources

Qualitative Factors

Leadership
Vision
Communication
Decision making
Collaboration
Integration of Processes & Discipline

uantitative is Measured, Qualitative is Acknowledg

Establishing Value
Step One: Measurement Criteria

Key: Establishing & calculating visible, measurable worth
for effort and assets expended, saved, re-used

- *Cost* - acquisition and life cycle *(investment potential)*
- *Price* - against risk and investment *(return)*
- *Re-use* - with metadata and characterization *(leverage factor)*
- *Measurable consistency* - from project to project *(data integrity)*
- *Evolving* - quality decision data *(KM or collaborative quality, use, and outcome)*

Establishing Value
Step Two: Maturity Model

The three essential macro states of DM maturity

Initial	*Transitional*	*Excellence*
Manual, inconsistent methods that are not repeatable (Asset Ignorance)	Course corrections that are applied in certain cases, over time Methods improve and gain consistency with understanding & use (Asset Recognition)	Improvements are predictable, proven, and intentionally created Repeatable methods create opportunities for efficiencies & economies of scale (Asset Use)

TIME, TECHNOLOGY, UNDERSTANDING & QUALITY

The Data Management Maturity Model

Maturity Levels 1-5	Process Performance	Technology Support	Quality, Predictability of Results
5 – Fully Optimized Data support success rate is 100%	Processes are almost entirely automated	Data mining, expert systems, knowledge management are enabled and employed routinely	Almost complete certainly of results is ach
4 – Predictable Risk Ability to routinely reduce uncertainty and data-related risk	Statistically stable processes routinely measured against industry standard performance metrics	Automation and background performance of processes, risks; automated decision support services	Reliability and predictability of results is significantly improved; e.g. six sigma vs three sigma
3 – Corporate Competency Capabilities are institutionalized within organization, enabled by mature technology	Standard, consistent, statistically capable measurable processes, performance metrics begin to evolve	Integrated technology designed to enable emerging best practices, technology suppliers are partners in defining how technology accomplishes best results	Good quality results within expected tolera most of the time; poorest individual perfor improve towards best performers; more lev achieved for best performers
2 – Managed Standardized tasks and roles, introduction of advanced technology begins	Individuals develop processes that work for them; not yet institutionalized across individuals or location.	Unintegrated point solutions designed for specific tasks and individuals spent much time figuring out how to integrate processes and technology to accomplish results	Variable quality with some predictability; b individual performers assigned to business projects to reduce risk and improve results
1 – Baseline Capable people and heroic efforts	No defined processes. Individual performers may follow a different process or pathway each time	General purpose tools: Excel, Access, or none at all. DM is a project function and not a corporate function	Organization depends entirely upon indivi little or no corporate visibility into DM cost performance; variable quality, low results predictability, little to no repeatability.

TIME, TECHNOLOGY, UNDERSTANDING & QUALITY

Value Determination Factors

Model Level	Value Determination Characteristics
5 Fully Optimized	Obvious value for services received; risk reduced, unnecessary costs avoided, clear best practices & sector leadership
4 Predictable Risk	Lower ROI in investments in DM are accepted in exchange for reduced risks
3 Corporate Competency	Measurable, able to recognize costs and benefits, perform cost/benefits analyses, maximize ROI, good results faster, better trained workforce
2 Managed	Anecdotal, based on individual performers' capabilities and specific memorable events
1 Baseline	Subjective, gut feel for performance, benefit, costs, and value received

Gains: Consistency, Repeatability, Cost & Business Model Awareness

Summary

- Maturity Models have potential for success
  - To be successful, they must be understood at - and mapped to - the application level of the enterprise processes
- DM and CM have the capability to integrate their areas of expertise to address most organizational challenges, as they touch the enterprise everywhere
- DM is making a contribution to the CMM/CMMI
- Discussion: How can we improve and leverage the CMMI opportunity to benefit DM, CM, and our organizations?